

What is Claimed Is:

1. A packaging and biological treatment system for a stream of products comprising:

means for conveying the stream of products;

5 means for sequentially enclosing the products into a plurality of discrete packages, wherein said discrete packages are enclosed and connected by a web enclosure; and

means for routing said discrete packages through a irradiation chamber via a circuitous path while said discrete packages remain connected by said web enclosure.

2. The packaging and biological treatment system of claim 1, wherein said
10 conveying means is comprised of a package forming station where a packaging material web is molded into an array of packages, a product filling station where the stream of products is deposited onto said array of packages, and a conveyor operatively connecting said package forming station and said product filling station with said enclosing means.

3. The packaging and biological treatment system of claim 1, wherein said
15 enclosing means is comprised of a sealing station having a web enclosure supply roll, a sealing die, and a thermosealing element in operative communication with said web enclosure and overlying said sealing die.

4. The packaging and biological treatment system of claim 1, wherein said routing
20 means comprises an entry region, a buffer region, and an exit region, wherein said buffer region selected from the group of buffers consisting of an bucket accumulator, a roller accumulator and a slackening trough.

5. The packaging and biological treatment system of claim 4, wherein said irradiation chamber further comprises a beam generator, a beam distributor, a target region, a beam generator shield, a target region shield, and a serpentine shield, wherein said serpentine

shield surrounds said circuitous path from said entry region to said target region and from said target region to said exit region.

6. The packaging and biological treatment system of claim 1, wherein said conveying means further comprises an index conveyor wherein said discrete packages are moved from a first position to a second position in a series of spaced intervals having a cyclical rate and wherein said routing means comprises a continuous speed conveyor wherein said discrete packages move through said irradiation chamber at a steady rate.

7. The packaging and biological treatment system of claim 6, further comprising a controller for matching said cyclical rate of said index conveyor with said steady rate of said continuous speed conveyor.

8. The packaging and biological treatment system of claim 1, further comprising a serpentine shield surrounding said circuitous path, said circuitous path comprising an entry point, an exit point, a substantially straight path within said irradiation chamber, a first arcuate path between said entry point and said substantially straight path and a second arcuate path between said substantially straight path and said exit point.

9. The packaging and biological treatment system of claim 1, further comprising a separating station wherein said web between said connected discrete packages is cut to form a set of disconnected packages.

10. The packaging and biological treatment system of claim 1 wherein said discrete packages traverse said irradiation chamber in a single layer array.

11. A packaging and biological treatment system for a stream of products comprising:

means for conveying the stream of products from a first position to a second position in a series of spaced intervals having a cyclical rate;

means for sequentially enclosing the products into a plurality of discrete packages during said series of spaced intervals, wherein said discrete packages are enclosed and connected by a web enclosure;

means for routing said discrete packages through a irradiation chamber at a steady rate;

5 and

means for matching said cyclical rate of said conveying means with said steady rate of said routing means.

12. The packaging and biological treatment system of claim 11, wherein said web enclosure connects said discrete packages within said irradiation chamber.

10 13. The packaging and biological treatment system of claim 11, wherein said discrete packages are disconnected from said web enclosure within said irradiation chamber.

14. The packaging and biological treatment system of claim 11, wherein said conveying means is comprised of a package forming station where a packaging material web is molded into an array of packages, a product filling station where the stream of products is
15 deposited onto said array of packages, and an indexed conveyor operatively connecting said package forming station and said product filling station with said enclosing means.

15. The packaging and biological treatment system of claim 11, wherein said enclosing means is comprised of a sealing station having a web enclosure supply roll, a sealing die, and a thermosealing element in operative communication with said web enclosure and
20 overlying said sealing die.

16. The packaging and biological treatment system of claim 11, wherein said routing means comprises an entry, a buffer, and an exit, and wherein said matching means comprises a controller.

17. The packaging and biological treatment system of claim 16, wherein said buffer

is further comprised of a circuitous path between said entry and said exit.

18. The packaging and biological treatment system of claim 17, wherein said irradiation chamber further comprises a beam generator, a beam distributor, a target region, a beam generator shield, a target region shield, and a serpentine shield, wherein said serpentine
5 shield surrounds said circuitous path from said entry to said target region and from said target region to said exit.

19. The packaging and biological treatment system of claim 18, wherein said serpentine shield further comprises a substantially straight path within said irradiation chamber, a first arcuate path between said entry and said substantially straight path and a second arcuate
10 path between said substantially straight path and said exit.

20. The packaging and biological treatment system of claim 16, wherein said buffer further comprises a separating station wherein said web between said connected discrete packages is cut to form a set of packages disconnected from said web enclosure, said buffer receiving said discrete packages at said entry with said cyclical rate of said conveying means
15 and passing said set of disconnected packages at said exit to said irradiation chamber.

21. The packaging and biological treatment system of claim 19, wherein said irradiation chamber further comprises a beam generator, a beam distributor, an entry region, an exit region, a target region between said entry region and said exit region, a beam generator shield, a target region shield, and a pair of shutter shields, wherein said shutter shields open for a
20 first period of time while a treated set of packages exit said irradiation chamber from said exit region and an unsterile set of packages enter said irradiation chamber, and wherein said shutter shields close for a second period of time while said unsterile set of packages are moved from said entry region through said target region to said exit region.

22. The packaging and biological treatment system of claim 11, further comprising a

serpentine shield surrounding said routing means, said serpentine shield comprising an entry point, an exit point, a substantially straight path within said irradiation chamber, a first arcuate path between said entry point and said substantially straight path and a second arcuate path between said substantially straight path and said exit point.

5 23. A packaging and biological treatment system for a stream of products comprising:

 an index conveyor comprising a filling station and a packaging station, wherein a plurality of discrete packages are filled with the stream of products, sealed and moved from a first position to a second position in a series of spaced intervals having a cyclical rate;

10 a irradiation chamber;

 a continuous speed conveyor wherein said discrete packages are moved through said irradiation chamber at a steady rate;

 a buffer wherein a set of said discrete packages moving at said cyclical rate are transitioned to said steady rate; and

15 a controller matching said cyclical rate of said index conveyor with said steady rate of said continuous speed conveyor.

 24. The packaging and biological treatment system of claim 23, wherein said web enclosure connects said discrete packages within said irradiation chamber.

 25. The packaging and biological treatment system of claim 23, wherein said
20 discrete packages are disconnected from said web enclosure within said irradiation chamber.

 26. The packaging and biological treatment system of claim 23, wherein said routing means comprises an entry region, a buffer region, and an exit region, wherein said buffer region selected from the group of buffers consisting of a linear accumulator, a roller accumulator, a bucket accumulator, and a slackening trough.

27. The packaging and biological treatment system of claim 23, wherein said routing means comprises an entry, a buffer, and an exit.

28. The packaging and biological treatment system of claim 27, wherein said buffer is further comprised of a circuitous path between said entry and said exit.

5 29. The packaging and biological treatment system of claim 28, wherein said irradiation chamber further comprises a beam generator, a beam distributor, a target region, a beam generator shield, a target region shield, and a serpentine shield, wherein said serpentine shield surrounds said circuitous path from said entry to said target region and from said target region to said exit.

10 30. The packaging and biological treatment system of claim 29, wherein said serpentine shield further comprises a substantially straight path within said irradiation chamber, a first arcuate path between said entry and said substantially straight path and a second arcuate path between said substantially straight path and said exit.

31. The packaging and biological treatment system of claim 27, wherein said buffer
15 further comprises a separating station wherein said web between said connected discrete packages is cut to form a set of packages disconnected from said web enclosure, said buffer receiving said discrete packages at said entry with said cyclical rate of said conveying means and passing said set of disconnected packages at said exit to said irradiation chamber.

32. The packaging and biological treatment system of claim 31, wherein said
20 irradiation chamber further comprises a beam generator, a beam distributor, an entry region, an exit region, a target region between said entry region and said exit region, a beam generator shield, a target region shield, and a pair of shutter shields, wherein said shutter shields open for a first period of time while a treated set of packages exit said irradiation chamber from said exit region and an untreated set of packages enter said irradiation chamber, and wherein said shutter

shields close for a second period of time while said untreated set of packages are moved from said entry region through said target region to said exit region.

33. The packaging and biological treatment system of claim 23, further comprising a radiation sensitive label on each of said discrete packages.